

# JOHN P. DAVIS

## CURRICULUM VITÆ

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### CURRENT POSITIONS

#### **University of Alberta, Edmonton, Alberta**

Professor, 2021 to present

#### **Resolved Instruments, Inc.**

Co-Founder and Chief Innovation Officer

### PREVIOUS EXPERIENCE & EDUCATION

#### **University of Alberta, Edmonton, Alberta**

Associate Professor: 2016 to 2021

Assistant Professor: 2010 to 2016

#### **University of Alberta, Edmonton, Alberta**

Post-Doctoral Fellow: June 2008 to September 2010

Adviser: Mark R. Freeman

#### **Northwestern University, Evanston, Illinois**

Ph.D. in Physics: Fall 2001 to April 17<sup>th</sup>, 2008

Adviser: William P. Halperin

Committee: William P. Halperin, James A. Sauls and John B. Ketterson

Thesis: "Transverse Sound Spectroscopy of Excited Cooper Pair States in Superfluid  $^3\text{He}$ "

#### **Northwestern University, Evanston, Illinois**

Master's in Physics: December 2003

Adviser: William P. Halperin

#### **Washington University, St. Louis, Missouri**

Bachelor's in Physics with Honors: Spring 2001

Honors Thesis Advisers: Kenneth F. Kelton and Patrick C. Gibbons

### HONORS

- ◇ Alfred P. Sloan Fellow, 2013-2015
- ◇ Petro-Canada Young Innovator Award, 2016
- ◇ Discovery Accelerator Awardee, 2016
- ◇ Provost's Award for Early Achievement of Excellence in Undergraduate Teaching, 2014
- ◇ Alberta Innovates Strategic Chair, 2012-2016
- ◇ Teaching "Honour Roll", University of Alberta Faculty of Science, 2014
- ◇ Teaching Excellence Appreciation Award from the Delta Chi Fraternity, University of Alberta Chapter, 2012
- ◇ Inaugural Fellow of the National Institute for Nanotechnology, NRC
- ◇ Associate Member of the former Canadian Institute for Advanced Research (CIFAR) Nanoelectronics Program, 2010-2013
- ◇ *Summa Cum Laude*, Washington University, St. Louis, Missouri, 2001

## PUBLICATIONS

60. Prototype Superfluid Gravitational Wave Detector, **V. Vadakkumbatt**, **M. Hirschel**, **J. Manley**, **T.J. Clark**, **S. Singh** and **J.P. Davis**, *under review* (2021). [[arXiv:2107.00120](#)]
59. Strong-coupling corrections to hard domain walls in superfluid  $^3\text{He-B}$ , **M.J. Rudd**, **P. Senarath Yapa**, **A.J. Shook**, **J. Maciejko**, and **J.P. Davis**, *under review* (2021). [[arXiv:2106.02065](#)]
58. Polymer-loaded three dimensional microwave cavities for hybrid quantum systems, **M. Ruether**, **C.A. Potts**, **J.P. Davis** and **L.J. LeBlanc**, *under review* (2021). [[arXiv:2104.10237](#)]
57. Dynamical Backaction Magnomechanics, **C.A. Potts**, **E. Varga**, **V.A.S.V. Bittencourt**, **S. Viola Kusminskiy** and **J.P. Davis**, *under review* (2021). [[arXiv:2104.11218](#)]
56. Observation of bistable turbulence in quasi-two-dimensional superflow, **E. Varga**, **V. Vadakkumbatt**, **A.J. Shook**, **P.H. Kim** and **J.P. Davis**, *Phys. Rev. Lett.* 125, 025301 (2020). - *Selected as an Editors' Suggestion* [[doi:10.1103/PhysRevLett.125.025301](#)]
55. Strong magnon-photon coupling within a tunable cryogenic microwave cavity, **C.A. Potts** and **J.P. Davis**, *Appl. Phys. Lett.* 116, 263503 (2020). [[doi:10.1063/5.0015660](#)]
54. Magnon-Phonon Quantum Correlation Thermometry, **C.A. Potts**, **V.A.S.V. Bittencourt**, **S. Viola Kusminskiy** and **J.P. Davis**, *Phys. Rev. Applied* 13, 064001 (2020). [[doi:10.1103/PhysRevApplied.13.064001](#)]
53. Wavelength transduction from a 3D microwave cavity to telecom using piezoelectric optomechanical crystals, **H. Ramp**, **T.J. Clark**, **B.D. Hauer**, **C. Doolin**, **K.C. Balram**, **K. Srinivasan** and **J.P. Davis**, *Appl. Phys. Lett.* 116, 174005 (2020). - *Selected as Feature article and for cover* [[doi:10.1063/5.0002160](#)] - also selected as a âScilightâ: [[doi:10.1063/10.0001223](#)]
52. Atomic microwave-to-optical signal transduction via magnetic-field coupling in a resonant microwave cavity, **A. Tretiakov**, **C.A. Potts**, **T.S. Lee**, **M.J. Thiessen**, **J.P. Davis** and **L.J. LeBlanc**, *Appl. Phys. Lett.* 116, 164101 (2020). - *Selected as Feature article and for cover* [[doi:10.1063/1.5144616](#)]
51. Stabilized Pair Density Wave via Nanoscale Confinement of Superfluid  $^3\text{He}$ , **A.J. Shook**, **V. Vadakkumbatt**, **P. Senarath Yapa**, **C. Doolin**, **R. Boyack**, **P.H. Kim**, **G.G. Popowich**, **F. Souris**, **H. Christani**, **J. Maciejko**, and **J.P. Davis**, *Phys. Rev. Lett.* 124, 015301 (2020). - *Selected as an Editors' Suggestion* [[doi:10.1103/PhysRevLett.124.015301](#)]
50. Coherent Magneto-Optomechanical Signal Transduction and Long-Distance Phase-Shift Keying, **M.J. Rudd**, **P.H. Kim**, **C.A. Potts**, **C. Doolin**, **H. Ramp**, **B.D. Hauer**, and **J.P. Davis**, *Phys. Rev. Applied* 12, 034042 (2019). - *Selected as an Editors' Suggestion* [[doi:10.1103/PhysRevApplied.12.034042](#)]
49. Elimination of Thermomechanical Noise in Piezoelectric Optomechanical Crystals, **H. Ramp**, **B.D. Hauer**, **K.C. Balram**, **T.J. Clark**, **K. Srinivasan**, and **J.P. Davis**, *Phys. Rev. Lett.* 123, 093603 (2019). [[doi:10.1103/PhysRevLett.123.093603](#)]
48. Dueling dynamical backaction in a cryogenic optomechanical cavity, **B.D. Hauer**, **T.J. Clark**, **P.H. Kim**, **C. Doolin**, and **J.P. Davis**, *Phys. Rev. A* 99, 053803 (2019). [[doi:10.1103/PhysRevA.99.053803](#)]
47. Two-Level System Damping in a Quasi-One-Dimensional Optomechanical Resonator, **B.D. Hauer**, **P.H. Kim**, **C. Doolin**, **F. Souris**, and **J.P. Davis**, *Phys. Rev. B* 98, 214303 (2018). [[doi:10.1103/PhysRevB.98.214303](#)]
46. Cryogenic Microwave Filter Cavity with a Tunability Greater than 5 GHz, **T.J. Clark**, **V. Vadakkumbatt**, **F. Souris**, **H. Ramp** and **J.P. Davis**, *Rev. Sci. Instr.* 89, 114704 (2018). [[doi:10.1063/1.5051042](#)]
45. Phonon Quantum Nondemolition Measurements in Nonlinearly Coupled Optomechanical Cavities, **B.D. Hauer**, **A. Metelmann** and **J.P. Davis**, *Phys. Rev. A* 98, 043804 (2018). [[doi:10.1103/PhysRevA.98.043804](#)]
44. Broadband optomechanical transduction of nanomagnetic spin modes, **P.H. Kim**, **F. Fani Sani**, **M.R. Freeman** and **J.P. Davis**, *Appl. Phys. Lett.* 113, 083104 (2018). [[doi:10.1063/1.5039640](#)]

43. Cooperativity enhancement in buckled-dome microcavities with omnidirectional claddings, S. Al-Sumaidae, M.H. Bitarafan, **C.A. Potts**, J.P. Davis, and R.G. DeCorby, *Optics Express* 26, 11201 (2018). [[doi:10.1364/OE.26.011201](https://doi.org/10.1364/OE.26.011201)] - Selected as "Editor's Pick".
42. Magnetic Actuation and Feedback Cooling of a Cavity Optomechanical Torque Sensor, **P.H. Kim**, **B.D. Hauer**, **T.J. Clark**, F. Fani Sani, M.R. Freeman and J.P. Davis, *Nat. Commun.* 8, 1355 (2017). [[doi:10.1038/s41467-017-01380-z](https://doi.org/10.1038/s41467-017-01380-z)]
41. Tuning a 3D Microwave Cavity via Superfluid Helium at MilliKelvin Temperatures, **F. Souris**, **H. Christiani** and J.P. Davis, *Appl. Phys. Lett.* 111, 172601 (2017). [[doi:10.1063/1.4997641](https://doi.org/10.1063/1.4997641)] - Feature article & selected as the cover for the October 23<sup>rd</sup> issue.
40. Ultra-Low Dissipation Superfluid Micromechanical Resonator, **F. Souris**, **X. Rojas**, **P.H. Kim** and J.P. Davis, *Phys. Rev. Applied* 7, 044008 (2017). [[doi:10.1103/PhysRevApplied.7.044008](https://doi.org/10.1103/PhysRevApplied.7.044008)]
39. Approaching the Standard Quantum Limit of Mechanical Torque Sensing, **P.H. Kim**, **B.D. Hauer**, **C. Doolin**, **F. Souris** and J.P. Davis, *Nat. Commun.* 7, 13165 (2016). [[doi:10.1038/ncomms13165](https://doi.org/10.1038/ncomms13165)]
38. Tunable open-access microcavities for on-chip cavity quantum electrodynamics, **C.A. Potts**, A. Melnyk, **H. Ramp**, M.H. Bitarafan, D. Vick, L.J. LeBlanc, J.P. Davis and R.G. DeCorby, *Appl. Phys. Lett.* 108, 041103 (2016). [[doi:10.1063/1.4940715](https://doi.org/10.1063/1.4940715)]
37. Optomechanics and thermometry of cryogenic silica microresonators, **A.J.R. MacDonald**, **B.D. Hauer**, **X. Rojas**, **P.H. Kim**, **G.G. Popowich** and J.P. Davis, *Phys. Rev. A* 93, 013836 (2016). [[doi:10.1103/PhysRevA.93.013836](https://doi.org/10.1103/PhysRevA.93.013836)]
36. Bistability in buckled dome microcavities, M.H. Bitarafan, **H. Ramp**, **C. Potts**, T.W. Allen, J.P. Davis and R.G. DeCorby, *Optics Letters* 40, 5375 (2015). [[doi:10.1364/OL.40.005375](https://doi.org/10.1364/OL.40.005375)]
35. Nonlinear Power Spectral Densities for the Harmonic Oscillator, **B.D. Hauer**, J. Maciejko and J.P. Davis, *Annals of Physics* 361, 148 (2015). [[doi:10.1016/j.aop.2015.05.031](https://doi.org/10.1016/j.aop.2015.05.031)]
34. Accurate sensing of the mass distribution of adsorbed molecules and their sublimation from nanomechanical strings, **T.S. Biswas**, Jin Xu, N. Miriyala, **C. Doolin**, T. Thundat, J.P. Davis and K.S.D. Beach, *Phys. Rev. Applied* 3, 064002 (2015). [[doi:10.1103/PhysRevApplied.3.064002](https://doi.org/10.1103/PhysRevApplied.3.064002)]
33. Thermo-mechanical characterization of on-chip buckled dome Fabry-Perot microcavities, M.H. Bitarafan, **H. Ramp**, T.W. Allen, **C. Potts**, **X. Rojas**, **A.J.R. MacDonald**, J.P. Davis and R.G. DeCorby, *J. Opt. Soc. Am. B* 32, 1214 (2015). [[doi:10.1364/JOSAB.32.001214](https://doi.org/10.1364/JOSAB.32.001214)]
32. Refractometric sensing of Li salt with visible-light Si<sub>3</sub>N<sub>4</sub> microdisk resonators, **C. Doolin**, **P. Doolin**, **B.C. Lewis** and J.P. Davis, *Appl. Phys. Lett.* 106, 081104 (2015). [[doi:10.1063/1.4913618](https://doi.org/10.1063/1.4913618)]
31. Optical microscope and tapered fiber coupling apparatus for a dilution refrigerator, **A.J.R. MacDonald**, **G.G. Popowich**, **B.D. Hauer**, **P.H. Kim**, **A. Fredrick**, **X. Rojas**, **P. Doolin**, and J.P. Davis, *Rev. Sci. Instr.* 86, 013107 (2015). [[doi:10.1063/1.4905682](https://doi.org/10.1063/1.4905682)]
30. A Superfluid Nanomechanical Resonator for Quantum Nanofluidics, **X. Rojas** and J.P. Davis, *Phys. Rev. B* 91, 024503 (2015). [[doi:10.1103/PhysRevB.91.024503](https://doi.org/10.1103/PhysRevB.91.024503)]
29. Femtogram-scale Photothermal Spectroscopy of Explosive Molecules on Nanostrings, **T.S. Biswas**, N. Miriyala, **C. Doolin**, X. Liu, T. Thundat and J.P. Davis, *Analytical Chemistry* 86, 11368-11372 (2014). [[doi:10.1021/ac503318e](https://doi.org/10.1021/ac503318e)]
28. Dissipative and Dispersive Optomechanics in a Nanocavity Torque Sensor, M. Wu, A.C. Hryciw, C.J. Healey, D.P. Lake, H. Jayakumar, M.R. Freeman, J.P. Davis and P.E. Barclay, *Phys. Rev. X* 4, 021052 (2014). [[doi:10.1103/PhysRevX.4.021052](https://doi.org/10.1103/PhysRevX.4.021052)]
27. Nonlinear optomechanics in the stationary regime, **C. Doolin**, **B.D. Hauer**, **P.H. Kim**, **A.J.R. MacDonald**, **H. Ramp** and J.P. Davis, *Phys. Rev. A* 89, 053838 (2014). [[doi:10.1103/PhysRevA.89.053838](https://doi.org/10.1103/PhysRevA.89.053838)]

26. Ultrasonic Interferometer for First-Sound Measurements of Confined Liquid  $^4\text{He}$ , **X. Rojas, B.D. Hauer, A.J.R. MacDonald, P. Saberi, Y. Yang** and J.P. Davis, *Phys. Rev. B* 89, 174508 (2014). [[doi:10.1103/PhysRevB.89.174508](https://doi.org/10.1103/PhysRevB.89.174508)]
25. Remote sensing in hybridized arrays of nanostrings, **T.S. Biswas**, Jin Xu, **X. Rojas, C. Doolin, A. Suhel**, K.S.D. Beach and J.P. Davis, *Nano. Lett.* 14, 2541-2545 (2014). [[doi:10.1021/nl500337q](https://doi.org/10.1021/nl500337q)]
24. On-chip cavity optomechanical coupling, **B.D. Hauer, P.H. Kim, C. Doolin, A.J.R. MacDonald, H. Ramp** and J.P. Davis, *EPJ Techniques and Instrumentation* 1, 4 (2014). [[doi:10.1140/epjti4](https://doi.org/10.1140/epjti4)]
23. Multidimensional Optomechanical Cantilevers for High Frequency Force Sensing, **C. Doolin, P.H. Kim, B.D. Hauer, A.J.R. MacDonald** and J.P. Davis, *New Journal of Physics* 16, 035001 (2014). [[doi:10.1088/1367-2630/16/3/035001](https://doi.org/10.1088/1367-2630/16/3/035001)]
22. A general procedure for thermomechanical calibration of nano/micro-mechanical resonators, **B.D. Hauer, C. Doolin**, K.S.D. Beach and J.P. Davis, *Annals of Physics* 339, 181 (2013). [[doi:10.1016/j.aop.2013.08.003](https://doi.org/10.1016/j.aop.2013.08.003)]
21. Quantitative Magneto-mechanical Detection and Control of the Barkhausen Effect, J.A.J. Burgess, A.E. Fraser, F. Fani Sani, D. Vick, **B.D. Hauer**, J.P. Davis and M.R. Freeman, *Science* 339, 1051 (2013). - *Selected for Science Express*. [[doi:10.1126/science.1231390](https://doi.org/10.1126/science.1231390)]
20. Nanoscale Torsional Optomechanics, **P.H. Kim, C. Doolin, B.D. Hauer**, M.R. Freeman, P.E. Barclay and J.P. Davis, *Appl. Phys. Lett.* 102, 053102 (2013). - *Selected as the cover for the February 4<sup>th</sup> issue*. - *One of most downloaded papers of APL in February 2013*. [[doi:10.1063/1.4789442](https://doi.org/10.1063/1.4789442)] Also selected for a Nature Research Highlight [[doi/10.1038/494151b](https://doi.org/10.1038/494151b)]
19. High-Q Gold and Silicon Nitride Bilayer Nanostrings, **T.S. Biswas, A. Suhel, B.D. Hauer, A. Palomino**, K.S.D. Beach and J.P. Davis, *Appl. Phys. Lett.* 101, 093105 (2012). [[doi:10.1063/1.4748977](https://doi.org/10.1063/1.4748977)]
18. Microfluidic and Nanofluidic Cavities for Quantum Fluids Experiments, **A. Duh, A. Suhel, B.D. Hauer, R. Saeedi, P.H. Kim, T.S. Biswas** and J.P. Davis, *J. Low Temp. Phys.* 168, 31 (2012). [[doi:10.1007/s10909-012-0617-4](https://doi.org/10.1007/s10909-012-0617-4)]
17. Dissipation Mechanisms in Thermomechanically Driven Silicon Nitride Nanostrings, **A. Suhel, B.D. Hauer, T.S. Biswas**, K.S.D. Beach and J.P. Davis, *Appl. Phys. Lett.* 100, 173111 (2012). [[doi:10.1063/1.4704914](https://doi.org/10.1063/1.4704914)]
16. Thermally Activated Decay of Magnetic Vortices, J.A.J. Burgess, D.C. Fortin, J.E. Losby, D. Grombacher, J.P. Davis and M.R. Freeman, *Phys. Rev. B* 82, 144403 (2010). [[doi:10.1103/PhysRevB.82.144403](https://doi.org/10.1103/PhysRevB.82.144403)]
15. Observation of Magnetic Supercooling of the Transition to the Vortex State, J.P. Davis, D. Vick, J.A.J. Burgess, D.C. Fortin, P. Li, V. Sauer, W.K. Hiebert and M.R. Freeman, *New J. of Physics* 12, 093033 (2010). [[doi:10.1088/1367-2630/12/9/093033](https://doi.org/10.1088/1367-2630/12/9/093033)]
14. Observation of the Transition between Real and Complex Superconducting Order Parameters Phases in  $\text{UPt}_3$ , J.D. Strand, D.J. Bahr, D.J. Van Harlingen, J.P. Davis, W.J. Gannon, W.P. Halperin, *Science* 328, 1368 (2010). [[doi:10.1126/science.1187943](https://doi.org/10.1126/science.1187943)]
13. Nano-Torsional Resonator Torque Magnetometry, J.P. Davis, D. Vick, D.C. Fortin, J.A.J. Burgess, W.K. Hiebert and M.R. Freeman, *Appl. Phys. Lett.* 96, 072513 (2010). - *Selected as the Research Highlight for March 2010*. [[doi:10.1063/1.3319502](https://doi.org/10.1063/1.3319502)]
12. Impurity Scattering of  $^3\text{He}$  in Aerogel, W.P. Halperin, H. Choi, J.P. Davis and J. Pollanen, *J. Phys. Soc. Jpn.* 77, 111002 (2008). [[doi:10.1143/JPSJ.77.111002](https://doi.org/10.1143/JPSJ.77.111002)]
11. High Frequency Sound in Superfluid  $^3\text{He}$ -B, J.P. Davis, H. Choi, J. Pollanen and W.P. Halperin, *J. Low Temp. Phys.* 153, 1 (2008). [[doi:10.1007/s10909-008-9819-1](https://doi.org/10.1007/s10909-008-9819-1)]
10. Anomalous Attenuation of Transverse Sound in  $^3\text{He}$ , J.P. Davis, J. Pollanen, H. Choi, J.A. Sauls, W.P. Halperin and A.B. Vorontsov, *Phys. Rev. Lett.* 101, 085301 (2008). [[doi:10.1103/PhysRevLett.101.085301](https://doi.org/10.1103/PhysRevLett.101.085301)]

9. Globally Anisotropic High Porosity Silica Aerogels, J. Pollanen, K. Shirer, S. Blinstein, J.P. Davis, H. Choi, T.M. Lippman, L.B. Lurio and W.P. Halperin, *J. Non-Crystalline Solids* 354, 4668-4674 (2008). [[doi:10.1016/j.jnoncrysol.2008.05.047](https://doi.org/10.1016/j.jnoncrysol.2008.05.047)]
8. Discovery of a New Excited Pair State in Superfluid  $^3\text{He}$ , J.P. Davis, J. Pollanen, H. Choi, J.A. Sauls and W.P. Halperin, *Nature Physics* 4, 571-575 (2008). [[doi:10.1038/nphys969](https://doi.org/10.1038/nphys969)]
7. Magnetoresistance of  $\text{UPt}_3$ , T.M. Lippman, H. Choi, J.P. Davis, J. Pollanen, W.J. Gannon and W.P. Halperin, *New J. of Physics* 10, 043006 (2008). [[doi:10.1088/1367-2630/10/4/043006](https://doi.org/10.1088/1367-2630/10/4/043006)]
6. Stability of the Axial Phase of Superfluid  $^3\text{He}$  in Aerogel with Globally Anisotropic Scattering, J.P. Davis, J. Pollanen, B. Reddy, K.R. Shirer, H. Choi and W.P. Halperin, *Phys. Rev. B* 77, 140502(R) (2008). [[doi:10.1103/PhysRevB.77.140502](https://doi.org/10.1103/PhysRevB.77.140502)]
5. Magneto-Acoustic Spectroscopy in Superfluid  $^3\text{He-B}$ , J.P. Davis, H. Choi, J. Pollanen and W.P. Halperin, *Phys. Rev. Lett.* 100, 015301 (2008). [[doi:10.1103/PhysRevLett.100.015301](https://doi.org/10.1103/PhysRevLett.100.015301)]
4. Strong coupling corrections to the Ginzburg-Landau theory of superfluid  $^3\text{He}$ , H. Choi, J.P. Davis, J. Pollanen, T. M. Haard and W. P. Halperin, *Phys. Rev. B* 75, 174503 (2007). [[doi:10.1103/PhysRevB.75.174503](https://doi.org/10.1103/PhysRevB.75.174503)]
3. Collective Modes and  $f$ -Wave Pairing Interactions in Superfluid  $^3\text{He}$ , J.P. Davis, H. Choi, J. Pollanen and W.P. Halperin, *Phys. Rev. Lett.* 97, 115301 (2006). [[doi:10.1103/PhysRevLett.97.115301](https://doi.org/10.1103/PhysRevLett.97.115301)]
2. Surface Specific Heat and Andreev Bound States, H. Choi, J.P. Davis, J. Pollanen and W.P. Halperin, *Phys. Rev. Lett.* 96, 125301 (2006). [[doi:10.1103/PhysRevLett.96.125301](https://doi.org/10.1103/PhysRevLett.96.125301)]
1. Specific Heat of Disordered Superfluid  $^3\text{He}$ , H. Choi, K. Yawata, T.M. Haard, J.P. Davis, G. Gervais, N. Mulders, P. Sharma, J.A. Sauls and W.P. Halperin, *Phys. Rev. Lett.* 93, 145301 (2004). [[doi:10.1103/PhysRevLett.93.145301](https://doi.org/10.1103/PhysRevLett.93.145301)]

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PROCEEDINGS

16. Measuring Twists with Cavity Optomechanics, **P.H. Kim, B.D. Hauer, C. Doolin, A.J.R. MacDonald, H. Ramp** and J.P. Davis, *Physics in Canada* 71, No. 3, 150 (2015). [[link to CAP website](#)]
15. Optomechanical torsional sensing in photonic crystal split-beam nanocavities, M. Wu, A.C. Hryciw, M.R. Freeman, J.P. Davis, P.E. Barclay, *CLEO: Science and Innovations*, (2013).
14. Dissipation Mechanisms In Thermomechanically Driven Silicon Nitride Nanostrings, **B.D. Hauer, A. Suhel, T.S. Biswas**, K.S.D. Beach, and J.P. Davis, *Physics in Canada* 68, No. 3, 134 (2012). [[link to pdf at CAP website](#)]
13. Photonic crystal paddle nanocavities for optomechanical torsion sensing, M. Wu, A.C. Hryciw, B. Khanaliloo, M.R. Freeman, J.P. Davis, P.E. Barclay, *CLEO: Science and Innovations*, May 6 (2012).
12. Nonlinear field-dependence of the Imaginary Squashing Mode of superfluid  $^3\text{He}$  at moderate magnetic fields, C.A. Collett, J. Pollanen, J.I.A. Li, W.J. Gannon, J.P. Davis, W.P. Halperin, *Journal of Physics: Conference Series* 400, 012006 (2012). [[doi:10.1088/1742-6596/400/1/012006](#)]
11. Nanomechanical Torsional Resonator Torque Magnetometry, J.P. Davis, D. Vick, P. Li, S.K.N. Portillo, A.E. Fraser, J.A.J. Burgess, D.C. Fortin, W.K. Hiebert and M.R. Freeman, *J. of Appl. Phys.* 109, 07D309 (2011). [[doi:10.1063/1.3540643](#)]
10. Superfluid phase stability of  $^3\text{He}$  in axially anisotropic aerogel, J. Pollanen, J.P. Davis, B. Reddy, K.R. Shirer, H. Choi and W.P. Halperin, *Journal of Physics: Conference Series* 150, 032084 (2009). [[doi:10.1088/1742-6596/150/3/032084](#)]
9. Low temperature thermal resistance for a new design of silver sinter heat exchanger, J. Pollanen, H. Choi, J.P. Davis, B.T. Rolfs, and W.P. Halperin, *Journal of Physics: Conference Series* 150, 012037 (2009). [[doi:10.1088/1742-6596/150/1/012037](#)]
8. Magnetoresistance of  $\text{UPt}_3$ , T.M. Lippman, J.P. Davis, H. Choi, J. Pollanen and W.P. Halperin, *J. Low Temp. Phys.* 148, 863 (2007). [[doi:10.1007/s10909-007-9469-8](#)]
7. Anisotropic Aerogels for Studying Superfluid  $^3\text{He}$ , J. Pollanen, S. Blinstein, H. Choi, J.P. Davis, T.M. Lippman, L.B. Lurio and W.P. Halperin, *J. Low Temp. Phys.* 148, 579 (2007). [[doi:10.1007/s10909-007-9449-z](#)]
6. Analysis of Strong-Coupling Parameters for Superfluid  $^3\text{He}$ , H. Choi, J.P. Davis, J. Pollanen, T.M. Haard and W.P. Halperin, *J. Low Temp. Phys.* 148, 507 (2007). [[doi:10.1007/s10909-007-9420-z](#)]
5. Imaginary Squashing Mode Spectroscopy of Helium Three B, J.P. Davis H. Choi, J. Pollanen and W.P. Halperin, *J. Low Temp. Phys.* 148, 501 (2007). [[doi:10.1007/s10909-007-9417-7](#)]
4. Specific Heat of Disordered  $^3\text{He}$ , AIP Proceedings, H. Choi, J.P. Davis, J. Pollanen, N. Mulders and W.P. Halperin, *AIP Conf. Proc.* 850, 241 (2006). [[doi:10.1063/1.2354683](#)]
3. Acoustic Spectroscopy of Superfluid  $^3\text{He}$  in Aerogel, J.P. Davis, H. Choi, J. Pollanen and W.P. Halperin, *AIP Conf. Proc.* 850, 239 (2006). [[doi:10.1063/1.2354682](#)]
2. Compressed Silica Aerogels for the Study of Superfluid  $^3\text{He}$  in Aerogel, J. Pollanen, H. Choi, J.P. Davis, S. Blinstein, T.M. Lippman, L.B. Lurio, N. Mulders and W.P. Halperin, *AIP Conf. Proc.* 850, 237 (2006). [[doi:10.1063/1.2354681](#)]
1. Ternary phase diagram studies in Ti-Zr-Ni alloys, J.P. Davis, E.H. Majzoub, J.M. Simmons and K.F. Kelton, *Materials Science and Engineering A* 294, 104 (2000). [[doi:10.1016/S0921-5093\(00\)01093-5](#)]

**FUNDING**

- ◇ CFI Innovation 2020 - UofA lead, awarded 4.9M for quantum-system nanofabrication infrastructure (total project led by UofC, awarded 13M)
- ◇ Alberta Innovates Major Initiative Fund: Quantum Technologies - 660k of 5.8M
- ◇ NSERC CREATE 2017 (lead applicant for team of six PIs) - 2.83M over 8 years including university matching
- ◇ CFI Innovation 2017 - UofA lead, awarded 2.78M for hybrid quantum system infrastructure (total project led by UofC, awarded 6.8M)
- ◇ Alberta Innovates Strategic Research Project - 231k per year for three years
- ◇ NSERC Discovery 2016 & Accelerator Supplement - 62k per year for 5 years (Discovery), plus 40k per year for 3 years (Accelerator)
- ◇ NSERC CRD - 75k over 2 years
- ◇ McDonald Institute HQP Pooled Resources Competition - 42k over 2 years
- ◇ NSERC Engage + AITF CASBE 2017 - 50k for 1 year
- ◇ Quantum Alberta Quantum Network Funding - 88.5k for one year
- ◇ NSERC Strategic Project Grant 2016 on quantum optomechanical devices (co-applicant) - 1/3 share of 192k per year for 3 years
- ◇ NSERC Strategic Project Grant 2016 on integrated platforms for quantum networks (co-applicant) - 1/3 share of 178k per year for 3 years
- ◇ Petro-Canada Young Innovator Award 2016 - 10k for one year
- ◇ NSERC Engage 2015 - 25k for 6 months
- ◇ Department of National Defence: Targeted Engagement Grant Program - 7.5k once
- ◇ Alfred P. Sloan Foundation 2013 - 50k over two years
- ◇ Alberta Innovates Technology Futures iCore Strategic Chair 2012 - 175k per year for 3 years
- ◇ Canada Foundation for Innovation 2010: Equipment & operating funds - 376k and 94k respectively
- ◇ Grand Challenges Canada: Stars in Global Health - 100k for 18 months
- ◇ NSERC Research Tools and Instruments ( $\times 2$ ) - 150k and 53k
- ◇ nanoBridge - 75k for one year
- ◇ University of Alberta: Faculty of Science & Office of the VP of Research - 745k (startup) and 43k (equipment)
- ◇ Canada School of Energy and the Environment ( $\times 2$ ) - 25k each
- ◇ Member of Alberta Innovates Health Solutions team funding - 30k per year for 3 years
- ◇ National Institute for Nanotechnology: 200k (startup) and team funding of  $\sim 15$ k per year for 5 years
- ◇ Alberta Innovates Technology Futures team funding - 30k per year for 3 years

# INVITED PRESENTATIONS

- ◇ Invited Talk at the International Conference on Quantum Fluids and Solids, Bangalore, India, August 2021.
- ◇ Invited Talk at the Kitchener-Waterloo Quantum Enthusiasts meet-up, February 2021.
- ◇ Invited Talk at the Ginzton Laboratory, Stanford University, Stanford, October 2020.
- ◇ Invited Talk at the 29th International Conference on Low Temperature Physics (LT29), Sapporo, Japan, August 2020. — Cancelled.
- ◇ Plenary Talk at 21st Annual Meeting of the APS Northwest Section, Kamloops, May 2020. — Cancelled.
- ◇ Invited Talk at APS March Meeting 2020, Denver, March 2020. — Cancelled.
- ◇ Invited Talk at the Physics of Quantum Electronics (PQE) 2020, Snowbird, January 2020.
- ◇ Talk at “Forty years of super-solid physics: a tribute to the career of John Beamish”, Edmonton, December 2019.
- ◇ Invited Talk at Quantum Alberta Workshop 2019, Edmonton, July 2019.
- ◇ Invited Talk at Photonics North, Québec City, May 2019.
- ◇ Invited Colloquium at Simon Fraser University, Burnaby, March 2019.
- ◇ Invited Seminar at D-Wave Systems, Burnaby, March 2019.
- ◇ Talk 2019 Frontiers of Nanomechanical Systems, Palm Springs, CA, February 2019.
- ◇ Invited Talk at AVS International Symposium 65, Long Beach, CA, October 2018.
- ◇ Invited Talk at the International Conference on Quantum Fluids and Solids, Tokyo, Japan, July 2018.
- ◇ Invited Talk at Canadian Association of Physicists Congress, Halifax, NS, June 2018.
- ◇ Invited Seminar at Michigan State University, East Lansing, MI, April 2018.
- ◇ Invited Seminar at Princeton University, Princeton, NJ, November 2017.
- ◇ Invited Talk at Photonics North, Ottawa, June 2017.
- ◇ Invited Talk at Spin Mechanics 4, Banff, February 2017.
- ◇ Invited Seminar at Brown University, Providence, RI, September 2016.
- ◇ Invited Colloquium at the Univ. of Lethbridge, Lethbridge, March 2016.
- ◇ Invited Talk at the Gordon Research Conference: Mechanical Systems in the Quantum Regime, Ventura, CA, 2016.
- ◇ Invited Seminar at the Univ. of British Columbia, Vancouver, February 2016.
- ◇ Invited docent for “Grand Challenges in Quantum Fluids and Solids” Workshop for “Micromechanical Oscillators” session, University of Buffalo, August 2015.
- ◇ Invited Talk at the International Conference on Quantum Fluids and Solids, QFS2015, August 2015.
- ◇ Invited Talk at the Canadian Association of Physicists Congress, June 2015.
- ◇ “How and why we quest for absolute zero” at University of Alberta Faculty of Science alumni events, Vancouver and Victoria, April 2015.
- ◇ Invited Talk on Helium Availability at the APS March Meeting, March 2015.
- ◇ Invited Seminar, University of Florida, February 23rd 2015.
- ◇ Invited Seminar, Washington University, February 16th 2015.
- ◇ Invited Colloquium, University of Calgary, January 23th 2015.
- ◇ Invited Seminar, University of Toronto, December 15th 2014.
- ◇ Invited Seminar, Northwestern University, February 27th 2014.
- ◇ Invited Colloquium in the Dept. of Physics, University of Waterloo, February 27th 2014.
- ◇ Invited Seminar in the Department of Applied Physics, Caltech, February 18th 2014.
- ◇ Invited Talk at the Opto- and Electro-Mechanics Workshop, Italy, January 2014.
- ◇ Invited Talk at the Livestock Gentec Symposium, Alberta, November 2013.
- ◇ Invited Seminar at the University of Virginia, Virginia, March 2013.
- ◇ Presentation at the Canadian Institute for Advanced Research Nanoelectronics Conference, Vancouver, British Columbia, November 2012.
- ◇ Presentation at Metabolomic Technologies Inc. Edmonton, Alberta, August 2012.
- ◇ Invited talk at the 3<sup>rd</sup> Korea-Japan Workshop on Quantum Phenomena in Helium, Daejeon, Korea, December 2010.
- ◇ Invited talk at the Canadian Institute for Advanced Research Nanoelectronics Conference, Banff, Alberta, November 2010.
- ◇ Physics Dept. Colloquium at the University of Alberta, Edmonton, Alberta, April 2010.
- ◇ Seminar at the University of Pittsburgh, Pennsylvania, January 2010.
- ◇ Invited talk at the QFS2009 Conference, Evanston, Illinois, August 2009.

**MEDIA**

Story about our spin-off, Resolved Instruments, in CMC Microsystems newsletter.

Story about our spin-off, Resolved Instruments, in UofA Science Contours alumni magazine.

Write up in Avenue Magazine about our low-temperature lab.

Story about our nanomechanics research in Edmonton Journal, May 5<sup>th</sup>, 2013.

Front page cover story in the Edmonton Journal, February 16<sup>th</sup>, 2013 about receiving the Sloan Fellowship.

Front page cover story in the Edmonton Journal, May 14<sup>th</sup>, 2012 about low-temperature lab.

Featured in the April 17<sup>th</sup>, 2012 (Vol. 26, No. 5) issue of superconducting industry trade magazine: Superconductor Week

Article in Chronicle of Higher Education

Story about our lab in Canadian Geographic Magazine, October 2012 issue.

Live on CTV "Afternoon Express" on August 7<sup>th</sup>, 2012 discussing helium conservation.

Article on cold, and our lab, in the St. Albert Gazette.

Nerd Nite Edmonton presenter and frequent contributor

CJSR Campus Radio: Sound of Science Podcast

**OTHER**

- ◇ Director and lead PI of the Quanta NSERC CREATE program
- ◇ Co-Founder, VP, and Chief Innovation Officer at Resolved Instruments ([www.resolvedinstruments.com](http://www.resolvedinstruments.com))
- ◇ Recently achieved cooling into superfluid phase of  $^3\text{He}$ , unique in Canada
- ◇ Co-chair of organizing committee for the International Conference for Quantum Fluids and Solids 2019
- ◇ Patent US62588527 "Optically Heated and Optically Measured Fouling Sensor"
- ◇ Member of International Program Advisory Committee for QFS2021, Bangalore India.
- ◇ Member of International Advisory Committee for 29th International Conference on Low Temperature Physics in Sapporo, Japan, 2020
- ◇ Faculty mentor for organizing team of CUPC (Canadian Undergraduate Physics Conference) 2018
- ◇ Graduate student Paul Kim won 1st place in Raith Micrograph image contest 2017
- ◇ Graduate student Brad Hauer awarded the Zurich Instruments Travel Grant 2015
- ◇ Postdoctoral Fellow Xavier Rojas awarded prestigious AITF Postdoctoral Fellowship
- ◇ Postdoctoral Fellow Xavier Rojas invited to speak at Quantum Fluids and Solids Conferences in both 2013 and 2015.
- ◇ Graduate student Allison MacDonald DCMMP division finalist in student oral competition at the 2015 Canadian Association of Physicists Conference
- ◇ Graduate student Paul Kim won best overall student poster at the 2015 Canadian Association of Physicists Conference
- ◇ Graduate student Brad Hauer won best overall student talk at the 2012 Canadian Association of Physicists Conference
- ◇ Graduate admissions and recruiting committee 2010-2013, 2018
- ◇ Co-organizer of the [Alberta Quantum-Nano Workshop, Red Deer AB](#) 2011 and 2014, in [Banff in 2016](#), and in Calgary in 2018.
- ◇ Executive committee of the Alberta Innovates funded Quantum Alberta
- ◇ Science representative on Engineering Faculty Council
- ◇ Lifetime member of the American Physical Society
- ◇ Lifetime member of the Division of Condensed Matter Physics of the APS
- ◇ Board of Directors and Treasurer of Garneau/University Early Learning Centre
- ◇ Vice-Chair of Parent Council of Garneau School

**TEACHING**

- ◇ 3 terms of PHYS310 - Thermodynamics (~ 60 students)
- ◇ 1 term of PHYS294 - General Physics Laboratory (24 students)
- ◇ 2 terms of PHYS311 - Statistical Physics (~ 50 students)
- ◇ 2 terms of PHYS495/595 - Physics Innovation and Entrepreneurship (15 students)
- ◇ 5 terms of PHYS130 - Wave Motion, Optics and Sound - lecturer (~ 250 students) and course coordinator (3 terms, 4 sections each term, ~ 1000 students)
- ◇ 4 terms of PHYS208 - Aspects of Modern Physics (~ 60 students)
- ◇ 2 terms of Science Internship Program coordinator for Physics

**CURRENT PERSONNEL**Postdoctoral Fellows:

Dr. Vaisakh Vadakkumbatt

Dr. Emil Varga

PhD Students:

Clinton Potts - NSERC PGS-M & PGS-D, Quanta CREATE top-up

Alex Shook - Quanta CREATE awardee

Elham Zohari - co-supervised with Paul Barclay

Ali Rashedi

Master's Students:

Sean McClure

Scott Agnew

Matthew Rudd - NSERC CGS & AI AGES

Marvin Hirschel

Undergraduate Students:

Robyn Learn

Camryn Undershute

**FORMER PERSONNEL**Postdoctoral Fellow:

Dr. Fabien Souris

- now at Institut NÈEL CNRS

Dr. Fatemeh Fani Sani

- now at TU Delft

Dr. Xavier Rojas - AITF Postdoctoral Fellowship

- now at Royal Holloway with prestigious Royal Society Fellowship

Research Assistant:

Abdul H. Suhel - (now Non-Destructive Testing Technician at Acuren)

Visiting Scholars:

Junko Kiriya-Taniguchi - University of Electro-Communications, Tokyo, Japan

PhD Students:

Hugh Ramp

- Thesis: "Microwave to Telecom Wavelength Transduction" - September 2020

- now Research Scientist at D-Wave Systems

Bradley D. Hauer

- Thesis: "On-Chip Silicon Optomechanical Cavities  
at Low Temperatures" - December 2019

- now post-doctoral fellow at NIST, Boulder

Callum Doolin

- Thesis: "Integrated optical and mechanical resonators  
for evanescent field sensing" - August 2019

- now Director: Scientific Research Operations at GFI Systems Inc

Paul H. Kim

- Thesis: "Passive and Active Cooling of Cavity Optomechanical Torque Sensors  
for Magnetometry Applications" - April 2019

- now Research Scientist at Norcada

Tushar S. Biswas

- Thesis: "Fabrication, Characterization, and Applications of Nanomechanical  
Resonators" - June 2017

- now Research Scientist at Avalon Holographics

## FORMER PERSONNEL CONTINUED

### Master's Students:

Tommy Clark

- Thesis: "Applications of superconducting re-entrant microwave cavities" - August 2019
- now PhD student at McGill University

Muhammad Ruhul Amin

- Thesis: "Sensing applications of nanomechanical resonators" - January 2017
- now PhD student at Univ. of Saskatchewan

Clinton Potts - NSERC PGS-M (co-supervised with Ray DeCorby of ECE)

- now PhD student in my group
- Thesis: "Integrated Devices for On-Chip Quantum Optics" - December 2016

Allison MacDonald - NSERC PGS-M, AITF Graduate Scholarship, QEII

- Thesis: "Cryogenic Optomechanics with Silica Microresonators" - March 2015
- now Research Scientist at D-Wave Systems

Kyle Reid

- Thesis: "Measuring Optomechanics with a Photon STM" - Jan. 2015
- now Research Scientist at Heraeus

Paul H. Kim - Queen Elizabeth Scholarship, NINT RA

- Thesis: "Nanoscale Torsional Optomechanics" - May 2014
- now Research Scientist at Norcada

Yikai Yang

- Thesis: "Electrical Properties of Al-Ge Granular Superconducting Films" - Dec. 2013
- now PhD student at EPFL

### Undergraduate Students:

Myles Ruether - (now Research Technician at SFU)

Nick Sorensen Sean McClure - Departmental SUPRE awardee

Ted Robinson - Departmental SUPRE awardee

Holly Christiani - URI Research Stipend - (now Research Technician at D-Wave Systems)

Matthew Thiessen - NSERC USRA

Tyler Zimmerling - NSERC USRA

Pearse Doolin - (CEO and co-Founder of Resolved Instruments)

Tommy Clark- NSERC USRA - (now graduate student in our group)

John Grey

Alberto Palomino - URI - (now Master's Program in Space Science at the University of Pisa)

Davis Iwaniuk

Aron Fredrick - NSERC USRA (now grad student at UBC)

Parnian Saberi - Ryerson Co-op, nanoUSRA (now pursuing PhD at University of Toronto)

Benjamin Rehl - nanoUSRA (now grad student in Dept. of Chemistry, U of A)

Alex Hoy

Andrej Duh - International Student Work Study Program

Soonho Kwon - STEP (now Co-Founder and CEO of EarlierCare)

Stephen Portillo - NSERC USRA (now pursuing PhD at Harvard University)

Rahmat Saeedi